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Please find below and/or attached an Office communication concerning this application or proceeding.

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BEFORE THE BOARD OF PATENT APPEALS AND INTERFERENCES

Application Number: 10/591,897
Filing Date: September 07, 2006
Appellant(s): LANG, TOBIAS

Michael J. Striker
For Appellant

EXAMINER'S ANSWER

This is in response to the Appeal Brief filed May 24, 2010, appealing from the Office Action mailed November 27, 2009.

(1) Real Party in Interest

The examiner has no comment on the statement, or lack of statement, identifying by name the real party in interest in the brief.

(2) Related Appeals and Interferences

The examiner is not aware of any related appeals, interferences, or judicial proceedings which will directly affect or be directly affected by or have a bearing on the Board's decision in the pending appeal.

(3) Status of Claims

The following is a list of claims that are rejected and pending in the application:

Claims 1 and 4-7 are rejected and pending in the application.

(4) Status of Amendments After Final

The examiner has no comment on the appellant's statement of the status of amendments after final rejection contained in the brief.

(5) Summary of Claimed Subject Matter

The examiner has no comment on the summary of claimed subject matter contained in the brief.

(6) Grounds of Rejection to be Reviewed on Appeal

The examiner has no comment on the appellant's statement of the grounds of rejection to be reviewed on appeal. Every ground of rejection set forth in the Office action from which the appeal is taken (as modified by any advisory actions) is being maintained by the examiner except for the grounds of rejection (if any) listed under the subheading "WITHDRAWN REJECTIONS." New grounds of rejection (if any) are provided under the subheading "NEW GROUNDS OF REJECTION."

(7) Claims Appendix

The examiner has no comment on the copy of the appealed claims contained in the Appendix to the appellant's brief.

(8) Evidence Relied Upon

JP2003050145A	ESHITA et al.	02-2003
5,633,715	AI et al.	05-1997

(9) Grounds of Rejection

The following ground(s) of rejection are applicable to the appealed claims:

- Claims 1 and 4-7 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claims 1 and 7 are considered to be vague and indefinite because they each include the equation $Ts \sim \left(\sum_{K=1}^{n} K * A(K)\right) / \sum_{K=1}^{n} A(K)$, which includes an undefined variable "A" making it unclear to one having ordinary skill in the art as to what the equation defines and how the equation is used in accordance with the remainder of the claim.

Claims 4-6 are rejected under 35 U.S.C. 112, second paragraph, because they incorporate the lack of clarity present in parent claim 1.

- Claims 1, 4, 6, and 7, as may best be understood, are rejected under 35 U.S.C. 103(a) as being unpatentable over JP Patent Application Publication No. 2003-050145 to Eshita et al. in view of U.S. Patent No. 5,633,715 to Ai et al.

With respect to claim 1, Eshita discloses an ultrasonic flow sensor (0014, lines 1-4), comprising at least one ultrasonic transducer for transmitting and receiving ultrasonic signals (0014, lines 1-4), and a receiver unit connected to the ultrasonic transducer (0014, lines 4-12) that detects a predetermined event of the ultrasonic signal as a reception time (0029, lines 1-4), wherein the receiver unit determines a time of a value characteristic of the ultrasonic signal (0026, lines 1-16) as well as a time shift of the time relative to the reception time and uses the time shift to determine a correct time value for the reception time (0032, lines 1-13).

As noted above, the invention of Eshita teaches many of the features of the claimed invention and while Eshita does disclose an ultrasonic flow sensor including

a receiver unit that determines a time of a value characteristic of the ultrasonic signal as a maximum amplitude of the ultrasonic signal (0026, lines 1-16), Eshita is not explicit in specifying that the receiver unit determines a chronological position of a focal point of either the ultrasonic signal or its envelope curve as the characteristic value.

Ai teaches a centroid approach for estimating modulation peak in broad-bandwidth interferometry comprising means for determining a chronological position of a focal point of a signal as $Ts \sim \left(\sum_{K=1}^{n} K * A(K)\right) / \sum_{K=1}^{n} A(K)$ (column 7, lines 10-24).

It would have been obvious to one having ordinary skill in the art to modify the invention of Eshita to explicitly indicate that the receiver unit determines a chronological position of a focal point of either the ultrasonic signal or its envelope curve as the characteristic value, as taught by Ai, because Eshita explicitly discloses determining a time of a value characteristic of the ultrasonic signal as a maximum amplitude of the ultrasonic signal (see, Eshita, Figure 2) and Ai suggests a corresponding means for determining such a maximum location using an accurate and simple calculation that is effective when dealing with a plurality of peaks that are difficult to distinguish (column 3, line 55 to column 4, line 38 and column 7, lines 10-24).

With respect to claim 4, the combination teaches the invention as claimed above and further Eshita discloses that the receiver unit includes a comparator whose input

is supplied with a transducer output signal and a reference signal (0022, lines 1 to 0023, line 13), and the receiver unit determines a piece of information about the time of the characteristic value from an output signal of the comparator (0026, lines 1-16).

With respect to claim 6, the combination teaches the invention as claimed above and further Eshita discloses that the reception time is corrected as a function of the time shift (0032, lines 1-13).

With respect to claim 7, Eshita discloses a method for detection of an ultrasonic signal (0014, lines 1-4) in an ultrasonic transducer by means of a receiver unit (0014, lines 1-4), which detects a predetermined event of the ultrasonic signal as a reception time (0029, lines 1-4), wherein the receiver unit determines a time of a value characteristic of the ultrasonic signal (0026, lines 1-16) and determines a time shift of the time in relation to the reception time and uses the time shift to determine a correct time value for the reception time (0032, lines 1-13).

As noted above, the invention of Eshita teaches many of the features of the claimed invention and while Eshita does disclose an ultrasonic flow sensor including a receiver unit that determines a time of a value characteristic of the ultrasonic signal as a maximum amplitude of the ultrasonic signal (0026, lines 1-16), Eshita is not explicit in specifying that the receiver unit determines a chronological position of a focal point of either the ultrasonic signal or its envelope curve as the characteristic value.

Ai teaches a centroid approach for estimating modulation peak in broad-bandwidth interferometry comprising means for determining a chronological position of a focal point of a signal as $Ts \sim \left(\sum_{K=1}^{n} K * A(K)\right) / \sum_{K=1}^{n} A(K)$ (column 7, lines 10-24).

It would have been obvious to one having ordinary skill in the art to modify the invention of Eshita to explicitly indicate that the receiver unit determines a chronological position of a focal point of either the ultrasonic signal or its envelope curve as the characteristic value, as taught by Ai, because Eshita explicitly discloses determining a time of a value characteristic of the ultrasonic signal as a maximum amplitude of the ultrasonic signal (see, Eshita, Figure 2) and Ai suggests a corresponding means for determining such a maximum location using an accurate and simple calculation that is effective when dealing with a plurality of peaks that are difficult to distinguish (column 3, line 55 to column 4, line 38 and column 7, lines 10-24).

- Claims 1 and 4-7, as may best be understood, are rejected under 35 U.S.C. 103(a) as being unpatentable over Applicant Admitted Prior Art in view of JP Patent Application Publication No. 2003-050145 to Eshita et al. and further in view of U.S. Patent No. 5,633,715 to Ai et al.

With respect to claim 1, Applicant admits as prior art an ultrasonic flow sensor (page 1, line 22 and Figure 1 – page 5, line 17), comprising at least one ultrasonic transducer for transmitting and receiving ultrasonic signals (page 1, lines 22-24 and

26-28 and Figure 1 – page 5, line 17), and a receiver unit connected to the ultrasonic transducer (page 6, line 30 to page 7, line 2) that detects a predetermined event of the ultrasonic signal as a reception time (page 6, lines 29-30), wherein the receiver unit determines a time of a value characteristic of the ultrasonic signal (page 7, lines 4-6) as a maximum amplitude of the ultrasonic signal (page 7, lines 4-6).

As noted above, the invention of AAPA teaches many of the features of the claimed invention and while Applicant does admit as Prior Art determining a reception time as well as a time value of a characteristic value of the ultrasonic signal, Applicant does not explicitly admit as prior art correcting the reception time based on a time shift of a time of the characteristic value relative to the reception time.

Eshita discloses an ultrasonic flow sensor (0014, lines 1-4), comprising at least one ultrasonic transducer for transmitting and receiving ultrasonic signals (0014, lines 1-4), and a receiver unit connected to the ultrasonic transducer (0014, lines 4-12) that detects a predetermined event of the ultrasonic signal as a reception time (0029, lines 1-4), wherein the receiver unit determines a time of a value characteristic of the ultrasonic signal (0026, lines 1-16) as well as a time shift of the time relative to the reception time and uses the time shift to determine a correct time value for the reception time, wherein the reception time is corrected as a function of the time shift (0032, lines 1-13).

It would have been obvious to one having ordinary skill in the art to modify the invention of AAPA to explicitly include correcting the reception time based on a time

shift of a time of the characteristic value relative to the reception time, as taught by Eshita, because, as suggested by Eshita, the combination would have improved the system of AAPA by correcting for incorrect wave arrival timing to increase the precision of the arrival timing resulting in greater accuracy in the flow determination of AAPA (0007, lines 2-15).

As noted above, the invention of AAPA and Eshita teaches many of the features of the claimed invention and while the invention of AAPA and Eshita does disclose an ultrasonic flow sensor including a receiver unit that determines a time of a value characteristic of the ultrasonic signal as a maximum amplitude of the ultrasonic signal and corrects a reception time based on a time shift of a time of a characteristic value relative to the reception time, the combination is not explicit in specifying that the receiver unit determines a chronological position of a focal point of either the ultrasonic signal or its envelope curve as the characteristic value.

Ai teaches a centroid approach for estimating modulation peak in broad-bandwidth interferometry comprising means for determining a chronological position of a focal point of a signal as $Ts \sim \left(\sum_{K=1}^{n} K * A(K)\right) / \sum_{K=1}^{n} A(K)$ (column 7, lines 10-24).

It would have been obvious to one having ordinary skill in the art to modify the invention of AAPA and Eshita to explicitly indicate that the receiver unit determines a chronological position of a focal point of either the ultrasonic signal or its envelope curve as the characteristic value, as taught by Ai, because AAPA and Eshita explicitly disclose determining a time of a value characteristic of the ultrasonic signal

as a maximum amplitude of the ultrasonic signal (see, AAPA, page 7, lines 4-6 and Eshita, Figure 2) and Ai suggests a corresponding means for determining such a maximum location using an accurate and simple calculation that is effective when dealing with a plurality of peaks that are difficult to distinguish (column 3, line 55 to column 4, line 38 and column 7, lines 10-24).

With respect to claim 4, the combination teaches the invention as claimed above and further Applicant admits as prior art that the receiver unit includes a comparator whose input is supplied with a transducer output signal and a reference signal (page 6, line 30 to page 7, line 2 and Figure 5 – page 5, line 29), and the receiver unit determines a piece of information about the time of the characteristic value from an output signal of the comparator (page 7, lines 2-6).

With respect to claim 5, the combination teaches the invention as claimed above and further Applicant admits as prior art that the reference signal supplied to the comparator is a threshold not equal to zero (page 6, line 30 to page 7, line 4 and page 7, lines 14-15) and the output signal of the comparator is a pulse width modulated signal from which the time of the characteristic value is determined (page 7, lines 4-6 and 14-15).

With respect to claim 6, as noted above, the invention of AAPA teaches many of the features of the claimed invention and while Applicant does admit as Prior Art determining a reception time as well as a time value of a characteristic value of the ultrasonic signal as a maximum amplitude of the ultrasonic signal, Applicant does not explicitly admit as prior art correcting the reception time based on a time shift of a time of the characteristic value relative to the reception time.

Eshita discloses an ultrasonic flow sensor (0014, lines 1-4), comprising at least one ultrasonic transducer for transmitting and receiving ultrasonic signals (0014, lines 1-4), and a receiver unit connected to the ultrasonic transducer (0014, lines 4-12) that detects a predetermined event of the ultrasonic signal as a reception time (0029, lines 1-4), wherein the receiver unit determines a time of a value characteristic of the ultrasonic signal (0026, lines 1-16) as well as a time shift of the time relative to the reception time and uses the time shift to determine a correct time value for the reception time, wherein the reception time is corrected as a function of the time shift (0032, lines 1-13).

It would have been obvious to one having ordinary skill in the art to modify the invention of AAPA to explicitly include correcting the reception time based on a time shift of a time of the characteristic value relative to the reception time, as taught by Eshita, because, as suggested by Eshita, the combination would have improved the system of AAPA by correcting for incorrect wave arrival timing to increase the precision of the arrival timing resulting in greater accuracy in the flow determination of AAPA (0007, lines 2-15).

With respect to claim 7, Applicant admits as prior art a method for detection of an ultrasonic signal in an ultrasonic transducer (page 1, lines 22-24 and 26-28 and Figure 1 – page 5, line 17) by means of a receiver unit (page 6, line 30 to page 7, line 2), which detects a predetermined event of the ultrasonic signal as a reception time (page 6, lines 29-30), wherein the receiver unit determines a time of a value characteristic of the ultrasonic signal (page 7, lines 4-6) as a maximum amplitude of the ultrasonic signal (page 7, lines 4-6).

As noted above, the invention of AAPA teaches many of the features of the claimed invention and while Applicant does admit as Prior Art determining a reception time as well as a time value of a characteristic value of the ultrasonic signal, Applicant does not explicitly admit as prior art correcting the reception time based on a time shift of a time of the characteristic value relative to the reception time.

Eshita discloses an ultrasonic flow sensor (0014, lines 1-4), comprising at least one ultrasonic transducer for transmitting and receiving ultrasonic signals (0014, lines 1-4), and a receiver unit connected to the ultrasonic transducer (0014, lines 4-12) that detects a predetermined event of the ultrasonic signal as a reception time (0029, lines 1-4), wherein the receiver unit determines a time of a value characteristic of the ultrasonic signal (0026, lines 1-16) as well as a time shift of the time relative to the reception time and uses the time shift to determine a correct time

value for the reception time, wherein the reception time is corrected as a function of the time shift (0032, lines 1-13).

It would have been obvious to one having ordinary skill in the art to modify the invention of AAPA to explicitly include correcting the reception time based on a time shift of a time of the characteristic value relative to the reception time, as taught by Eshita, because, as suggested by Eshita, the combination would have improved the system of AAPA by correcting for incorrect wave arrival timing to increase the precision of the arrival timing resulting in greater accuracy in the flow determination of AAPA (0007, lines 2-15).

As noted above, the invention of AAPA and Eshita teaches many of the features of the claimed invention and while the invention of AAPA and Eshita does disclose an ultrasonic flow sensor including a receiver unit that determines a time of a value characteristic of the ultrasonic signal as a maximum amplitude of the ultrasonic signal and corrects a reception time based on a time shift of a time of a characteristic value relative to the reception time, the combination is not explicit in specifying that the receiver unit determines a chronological position of a focal point of either the ultrasonic signal or its envelope curve as the characteristic value.

Ai teaches a centroid approach for estimating modulation peak in broad-bandwidth interferometry comprising means for determining a chronological position of a focal point of a signal as $Ts \sim \left(\sum_{K=1}^{n} K * A(K)\right) / \sum_{K=1}^{n} A(K)$ (column 7, lines 10-24).

It would have been obvious to one having ordinary skill in the art to modify the invention of AAPA and Eshita to explicitly indicate that the receiver unit determines a chronological position of a focal point of either the ultrasonic signal or its envelope curve as the characteristic value, as taught by Ai, because AAPA and Eshita explicitly disclose determining a time of a value characteristic of the ultrasonic signal as a maximum amplitude of the ultrasonic signal (see, AAPA, page 7, lines 4-6 and Eshita, Figure 2) and Ai suggests a corresponding means for determining such a maximum location using an accurate and simple calculation that is effective when dealing with a plurality of peaks that are difficult to distinguish (column 3, line 55 to column 4, line 38 and column 7, lines 10-24).

(10) Response to Argument

- In response to the rejection of claims 1 and 4-7 under 35 U.S.C. 112, second paragraph, Appellant argues:

> To support the final rejection of claims 1 and 4-7 under 35 USC §112, second paragraph, the final Office Action at paragraph 3 states that claims 1 and 7 (the independent claims) are considered to be vague and indefinite because they each include the equation
>
> $$Ts \sim \left(\sum_{K=1}^{n} K * A(K) \right) / \sum_{K=1}^{n} A(K)$$
>
> which includes undefined variables "K" and "A" making it unclear to one having ordinary skill in the art as to what the equation defines and how the equation is used in accordance with the remainder of the claim.
>
> Appellant's Request For Reconsideration respectfully asserted that "K" is an integer in an integer range of 1 to "n," where "n" represents the highest integer value in said integer range and that "A(K)" is a function of K that is the amplitude of the K^{th} half-wave, after the threshold (trigger time) is exceeded. Ts is the

chronological focal point of envelope curve 6, and that the skilled artisan would understand that the equation that Ts is a summation of "n" calculations of the equation's argument, taken at each consecutive integer value K=1, ... K=n.

In the Advisory Action dated February 17, 2010, which maintained the rejection on final, the Examiner repeated verbatim the final rejection. No analysis as to why the phrases used in the claim are vague and indefinite was offered in the response to appellant's Request For Reconsideration; MPEP 2173.02.

The Examiner maintains the rejection of claims 1 and 7 under 35 U.S.C. 112, second paragraph, for the following reasons:

First, the Examiner asserts that although the claims are interpreted in light of the specification, limitations from the specification are not read into the claims. See *In re Van Geuns*, 988 F.2d 1181, 26 USPQ2d 1057 (Fed. Cir. 1993). Therefore, while the Examiner agrees with Appellant that one having ordinary skill in the art would recognize that “K” corresponds to an integer index, the Examiner asserts there is nothing in the claim that requires or defines that A(K) is “the amplitude of the K^{th} half-wave, after the threshold (trigger time) is exceeded”. Further, if one having ordinary skill in the art would assume A(K) to be “the amplitude of the K^{th} half-wave, after the threshold (trigger time) is exceeded”, such an assumption would raise an issue of indefiniteness under 35 U.S.C. 112, second paragraph, as it would be unclear to one having ordinary skill in the art as to what "the K^{th} half-wave” and/or "the threshold (trigger time)” refers since there is nothing in the claim that presents such a “K^{th} half-wave” or "the threshold (trigger time)". Further, it would be unclear to one having ordinary skill in the art whether or not the “K^{th} half-wave” somehow

refers/relates to the previously presented "ultrasonic signal" and/or whether or not "the threshold (trigger time)" somehow refers/relates to the previously presented times "t_0" or "t_1".

Second, the Examiner asserts that claim 1, for example, recites:

> An ultrasonic flow sensor, comprising at least one ultrasonic transducer for transmitting and receiving ultrasonic signals, and a receiver unit (4) connected to the at least one ultrasonic transducer that detects a predetermined event (N) of an ultrasonic signal as a reception time (t_0), wherein the receiver unit (4) determines a time (t_1) of a characteristic value of the ultrasonic signal as well as a time shift (Δt) of the time (t_1) relative to the reception time (t_0) and uses the time shift (Δt) to determine a correct time value for the reception time (t_0), wherein the receiver unit (4) determines a chronological position (Ts) of a focal point of either the ultrasonic signal or its envelope curve (6) as the characteristic value, wherein $Ts \sim \left(\sum_{K=1}^{n} K * A(K)\right) / \sum_{K=1}^{n} A(K)$.

The Examiner asserts that claim 1 presents "ultrasonic signals", "a predetermined event (N) of an ultrasonic signal as a reception time (t_0)", "a time (t_1) of a characteristic value of the ultrasonic signal", and "the ultrasonic signal or its envelope curve". The Examiner asserts that by only defining the characteristic value as $Ts \sim \left(\sum_{K=1}^{n} K * A(K)\right) / \sum_{K=1}^{n} A(K)$ without clearly defining "A", it is unclear to one having ordinary skill in the art as to how the equation is used in accordance with the remainder of the claim, specifically, whether or not the integer index K is to somehow correspond/relate to the predetermined event or to one of the times t_0 or t_1, as well as whether or not the amplitude "A(K)" is to somehow correspond/relate to

an amplitude of the predetermined event, amplitude of the characteristic value, amplitude of the ultrasonic signal, and/or an amplitude of the envelope curve.

Therefore, the Examiner maintains that the undefined variable "A" makes claims 1 and 7, and consequently claims 4-6 due to their dependency, unclear under 35 U.S.C. 112, second paragraph.

- In response to the rejection of claims 1, 4, 6, and 7, as may best be understood due to the indefiniteness discussed above, under 35 U.S.C. 103(a) as being unpatentable over JP Patent Application Publication No. 2003-050145 to Eshita et al. in view of U.S. Patent No. 5,633,715 to Ai et al., Appellant argues:

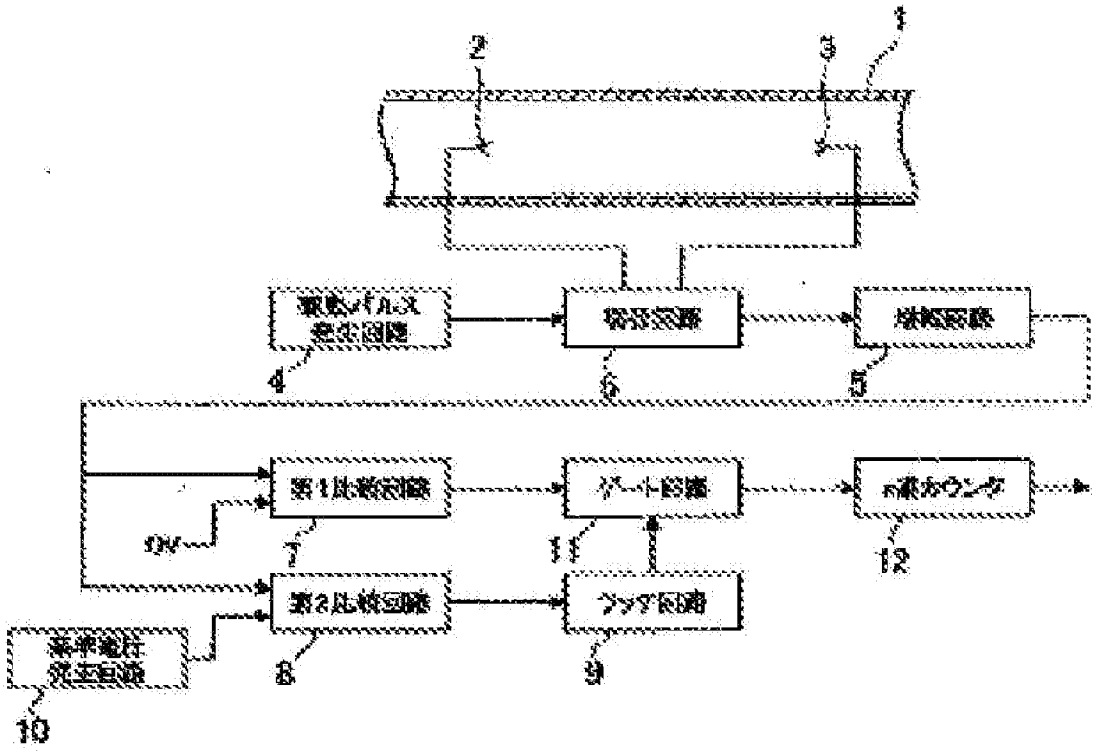
> While Appellant agrees that Eshita discloses determining a reception time of ultrasonic signals, and that Ai discloses identifying peaks of broad bandwidth interferometric signals, appellant respectfully disagrees with this analysis as a whole, and that either Eshita or Ai teach detecting a reception time (t_0), determining a time (t_1) of a characteristic value, determining a time shift (Δt) of the time (t_1) relative to the reception time (t_0) and using the time shift (Δt) to determine a correct time value for the reception time (t_0).
>
> While the Examiner asserts that Eshita discloses a receiver unit that determines a time of a value characteristic of the ultrasonic signal at paragraph [0026], lines 1-16, paragraph [0026] merely teaches how Eshita calculates a reception time. Paragraph [0026] makes no suggestion of characteristic value of the ultrasonic signal, as claimed.
>
> In more detail, Eshita's paragraph [0026] discloses that, after square wave (K) is counted, there is a wait or count of three more waves rising before the received signal is acknowledged. Nowhere does Eshita disclose determining a time **(t_1) of a characteristic value**, (emphasis added). Put another way, Eshita's operation of detecting the zero crossings is not equivalent to determining a time t_1 of the maximum amplitude as a reference point, as claimed.
>
> Eshita's paragraph [0032] does not disclose using a time shift (Δt) of the time (t_1) of the characteristic value relative to the reception time (t_0) to determine a correct time value for the reception time (t_0). Eshita merely subtracts a "predetermined" time from the time of flight calculation, so this "subtracting

> 'predetermined' time received wave (W) reaching timing also considering the time of the event of the supersonic wave being first received" disclosed by Eshita at paragraph [0032] cannot be said to be equivalent to the ***receiver determining*** a time shift (Δt) of the time (t_1) of the characteristic value of the ultrasonic signal relative to the reception time (t_0), as claimed (emphasis added).

After careful consideration of Appellant's arguments and a thorough re-reading of the applied art, the Examiner maintains the outstanding rejection for the following reasons:

First, the Examiner maintains that Eshita discloses an ultrasonic flow sensor (0014, lines 1-4), comprising at least one ultrasonic transducer for transmitting and receiving ultrasonic signals (0014, lines 1-4), and a receiver unit connected to the ultrasonic transducer that performs signal analysis (0014, lines 4-12), specifically:

> In Figure 1, (1) is the ultrasonic flow velocity measuring tube, (2) and (3) are ultrasonic vibrators arranged with a prescribed distance at the upstream and the downstream in a flowing direction, and (4) is a driving pulse generating circuit for generating driving pulses. (5) is a received wave amplifying circuit for outputting received waves when ultrasonic waves are received by the ultrasonic vibrators (2) and (3). (6) is a switching circuit for switching the connection of each ultrasonic vibrator (2) and (3), driving pulse generating circuit (4), and received wave amplifying circuit (5), and these parts are the same as those shown in Figure 3. (0014, lines 1-12)



The Examiner then maintains that Eshita discloses that the receiver unit detects a predetermined event (N) of the ultrasonic signal as a reception time (t_0) (0029, lines 1-4) by determining a received wave W arrival timing, specifically:

> In addition, in this embodiment, the second wave (W2) of the received wave (W) has been used in the reception decision; however, other waves of the first part of the received wave (W) may also be used (0029, lines 1-4).

The Examiner asserts that Eshita then discloses that the receiver unit determines a time (t_1) of a characteristic value of the ultrasonic signal (0026, lines 1-16) by determining a zero-crossing time Z of a characteristic value Wm, specifically:

> The n-base counter (12), as shown in Figure 12(e), counts the rectangular waves (K) passed through the gate circuit (ii). When a prescribed wave number

> (2 waves in this embodiment) of these rectangular waves (K) is counted, that is, when the third rectangular wave (K) rises after starting counting of the rectangular wave (K), it is adopted as the ultrasonic wave arrival timing, and the ultrasonic wave arrival pulse (J) is output. In this manner, since the zero crossing time (Z) of the wave (Wm) with the maximum amplitude is adopted as the ultrasonic wave arrival timing, the change of the zero crossing time (Z) due to interference such as reflected waves of the previous measurement and environmental noises is small, and the received wave (W) arrival timing for measuring a propagation time difference can be specified with good precision (0026, lines 1-16).

The Examiner further asserts that Eshita discloses that the receiver unit determines a time shift (Δt) of the time (t_1) relative to the reception time (t_0) and uses the time shift (Δt) to determine a correct time value for the reception time (t_0) (0032, lines 1-13) by calculating a value representing the difference between the adopted wave arrival timing, corresponding to the zero-crossing time Z of characteristic Wm, and the actual received wave W arrival timing in order to obtain the actual received wave W arrival timing to be used in a propagation determination, specifically:

> Moreover, the zero crossing time (Z) of the wave (Wm) with the maximum amplitude of the received wave (W) has been adopted as the ultrasonic wave arrival timing, however the zero crossing time of waves in the vicinity of the wave (Wm) with the maximum amplitude may also be adopted as the ultrasonic wave arrival timing (0030, lines 1-6).

> In addition, the propagation time of the ultrasonic waves has been the time until the ultrasonic wave arrival time from the time when the ultrasonic waves are transmitted; however, the propagation time may also be the time from the transmission time of the ultrasonic waves to the time when a prescribed time is subtracted from or added to the ultrasonic wave arrival timing. For example, the time when the ultrasonic waves are received for the first time by subtracting a prescribed time from the received wave (W) arrival timing, and the time from the transmission time of the ultrasonic waves to the reception time of the ultrasonic waves for the first time may also be adopted as the propagation time of the ultrasonic waves (0032, lines 1-13).

More specifically, the Examiner asserts that propagation is usually determined as a time from transmission time to arrival time, with arrival time corresponding to wave arrival timing W (i.e. predetermined event (N) of an ultrasonic signal as a reception time (t_0)). Eshita, however, discloses that "the zero crossing time (Z) of the wave (Wm) with the maximum amplitude of the received wave (W) has been adopted as the ultrasonic wave arrival timing" meaning that rather than using the arrival time corresponding to wave arrival timing W, some "predetermined time" must be calculated to shift from the normal wave arrival timing W to the zero crossing time (Z) of the wave (Wm). (Appellant agrees that Eshita discloses such a different method of calculating the arrival time, as Appellant states above that "paragraph [0026] merely teaches how Eshita calculates a reception time"). The Examiner then asserts that Eshita discloses that this "predetermined time" is determined by calculating a time shift (Δt) between the zero crossing time Z (i.e. t_1) of a characteristic value of the ultrasonic signal Wm, and using the time shift to determining a correct time value for the arrival timing W (i.e. t_0) (i.e. a correct time value based on the maximum amplitude Wm rather than the normal arrival timing W).

Therefore, while Appellant argues that "Eshita's operation of detecting the zero crossings is not equivalent to determining a time t_1 of the maximum amplitude as a reference point, as claimed", the Examiner asserts that Appellant has not clearly indicated or provided any reason as to why a time determined by a zero-crossing of

a characteristic value Wm cannot meet the claimed determination of a time (t_1) of a characteristic value of the ultrasonic signal, and, as can be seen by the cited section above, the Examiner asserts that Eshita does more than simply determine zero crossings, but specifically discloses determining a zero-crossing time Z (i.e. t_1) of a characteristic value Wm.

Further, while Appellant argues that "Eshita merely subtracts a 'predetermined' time from the time of flight calculation, so this 'subtracting 'predetermined' time received wave (W) reaching timing also considering the time of the event of the supersonic wave being first received' disclosed by Eshita at paragraph [0032] cannot be said to be equivalent to the ***receiver determining*** a time shift (Δt) of the time (t_1) of the characteristic value of the ultrasonic signal relative to the reception time (t_0), as claimed", the Examiner asserts that the section of Eshita discussed above discloses calculating a value representing the difference between the adopted wave arrival timing, corresponding to the zero-crossing time Z of characteristic Wm, and the actual received wave W arrival timing in order to obtain the actual received wave W arrival timing to be used in a propagation determination.

Appellant argues:

> While the Examiner asserts that Ai teaches a centroid approach to estimate modulation peak in broad bandwidth interferometer with means for determining a chronological position of a focal point of a signal Ts, and that it would have been obvious to modify Eshita with the teachings of Ai to realize a receiver unit that determines a chronological position of a focal point of the ultrasonic signal or its envelope as the characteristic value, appellant further respectfully disagrees.

At col. 7, lines 10-24, Ai discloses determining a peak (z) of bell-shaped curve f(z), and makes clear that any error or shift ("z will differ from the abscissa of its peak") in the peak resulting from naturally occurring asymmetry in f(z) as the interferometry data are captured, is consistently repeated but only as long as the data remain substantially unchanged. Col. 3, line 55-col. 4, line 19, merely talks about problems in the art with repeatability of modulation-peak estimation.

Ai in essence states that while the data remains unchanged, the error is always consistently reflected "perfectly" in the relative measure. Ai not only suggests operating with error, Ai does not mention operation where data is inconsistent, that is, where there is fluctuating signal amplitude, the circumstances for which applicant's invention as claimed were meant to overcome.

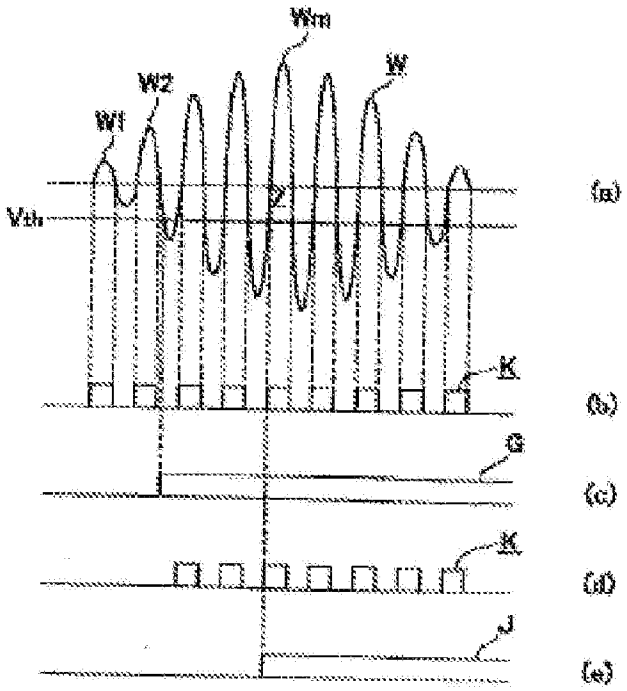
So while the Examiner asserts that the skilled artisan would have looked to Ai to modify Eshita's receiver unit so the receiver unit could determine a chronological position of a focal point or either the ultrasonic signal or its envelope curve as the characteristic value, as taught by Ai, appellant disagrees. And while Ai teaches improving finding a peak, Eshita does not teach finding a peak or characteristic value, still less according to Ts.

The Examiner first disagrees with Appellant's interpretation of Eshita and Appellant's indication that "Eshita does not teach finding a peak or characteristic value" and instead maintains that Eshita does disclose an ultrasonic flow sensor including a receiver unit that determines a time of a value characteristic of the ultrasonic signal as a maximum amplitude of the ultrasonic signal (i.e. time Z of maximum amplitude Wm) (0026, lines 1-16), specifically:

The n-base counter (12), as shown in Figure 12(e), counts the rectangular waves (K) passed through the gate circuit (ii). When a prescribed wave number (2 waves in this embodiment) of these rectangular waves (K) is counted, that is, when the third rectangular wave (K) rises after starting counting of the rectangular wave (K), it is adopted as the ultrasonic wave arrival timing, and the ultrasonic wave arrival pulse (J) is output. In this manner, since the zero crossing time (Z) of the wave (Wm) with the maximum amplitude is adopted as the ultrasonic wave arrival timing, the change of the zero crossing time (Z) due to interference such as reflected waves of the previous measurement and environmental noises is small, and the received wave (W) arrival timing for

measuring a propagation time difference can be specified with good precision (0026, lines 1-16).

【図２】



The Examiner then asserts that Ai teaches a centroid approach for estimating modulation peak in broad-bandwidth interferometry comprising means for determining a chronological position of a focal point of a signal as

$$Ts \sim \left(\sum_{K=1}^{n} K * A(K) \right) / \sum_{K=1}^{n} A(K)$$

(column 7, lines 10-24), specifically:

> In general, for any symmetrical, perfectly bell-shaped function f(z) for which n discrete measurements have been taken at n values of z during scanning, the vertical position z corresponding to the peak of such bell-shaped function f(z) would also be the centroid of the function and could be found from the general relationship $$z = \frac{\Sigma[zf(z)]}{\Sigma f(z)}$$
>
> To the extent that in practice the function f(z) may not be perfectly symmetrical, z will differ from the abscissa of its peak, but it will reflect a shift that is consistently repeated during measurements so long as the shape of the curve remains substantially unchanged, thereby providing a perfect measure of relative translation during scanning.

Therefore, because Eshita explicitly discloses determining a time of a value characteristic of the ultrasonic signal as a maximum amplitude of the ultrasonic signal, but is silent as to the specific manner to find such a maximum amplitude and because Ai suggests a corresponding means for determining such a maximum location using an accurate and simple calculation that is effective when dealing with a plurality of peaks that are difficult to distinguish (Ai; column 3, line 55 to column 4, line 38 and column 7, lines 10-24) and because Appellant admits that “Ai teaches improving finding a peak” (Appeal Brief, page 14, line 8), the Examiner maintains that it would have been obvious to one having ordinary skill in the art to modify the invention of Eshita to explicitly indicate that the receiver unit determines a chronological position of a focal point of either the ultrasonic signal or its envelope curve as the characteristic value using the specific equation provided.

Appellant argues:

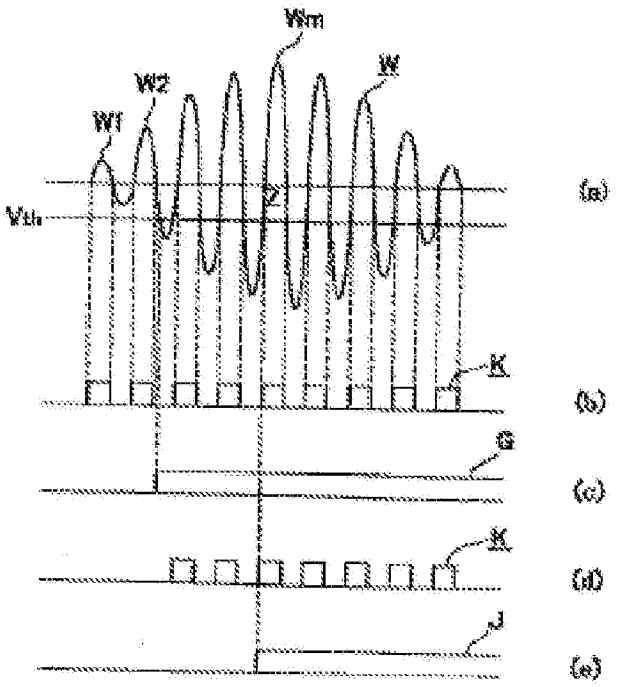
> But even if the references could be combined, Eshita could not be modified by the teachings of Ai without a substantial modification effort. Eshita does not determine a chronological position of a focal point of either the ultrasonic signal or its envelope curve as the characteristic curve, the time of the characteristic value and time shift (as stated above). To do so, Eshita's detectors and internal processor, for example, the instructions control overall operation, would need to be modified. While such a modification could be implemented, it is not a simple task and the skilled artisan would not have thought to do so.
>
> Such proposed modification would render the Eshita unsatisfactory for its intended purpose (see In re Gordon, 221 USPQ 1125 (Fed. Cir. 1984)), and/or at least change Eshita's respective principles of operation ('see In re Ratti, 123 USPQ 349 (CCPA 1959)), which in either case compels a legal conclusion that the proposed combinations cannot be obvious under the law; MPEP 2143.01.
>
> Perhaps more importantly, appellant's invention is not merely a combination that includes finding a reception time, as taught by Eshita, and finding a peak, or improving the accuracy of finding a peak, as taught by Ai. Appellant claims finding a time t_1 of a characteristic value of a detected signal, calculating a time shift Δt of the time t_1 of the characteristic value of the ultrasonic signal relative to the reception time t_0, and using the time shift Δt to determine a correct time value for the reception time t_0. Hence, even modifying Eshita with the teachings of Ai still does not realize the invention, as claimed.

The Examiner disagrees with Appellant's indication that the "proposed modification would render the Eshita unsatisfactory for its intended purpose…and/or at least change Eshita's respective principles of operation". Instead, as Appellant first indicates, to perform the proposed modification, "Eshita's detectors and internal processor, for example, the instructions control overall operation, would need to be modified" wherein "such a modification could be implemented". The Examiner asserts that requiring some modification of the primary reference is permitted in a *prima facie* case of obviousness and such modification does not inherently mean that the primary reference is no longer satisfactory for its intended purpose. Instead, the Examiner asserts that obviousness may be established by combining or

modifying the teachings of the prior art to produce the claimed invention where there is some teaching, suggestion, or motivation to do so found either in the references themselves or in the knowledge generally available to one of ordinary skill in the art. See *In re Fine*, 837 F.2d 1071, 5 USPQ2d 1596 (Fed. Cir. 1988), *In re Jones*, 958 F.2d 347, 21 USPQ2d 1941 (Fed. Cir. 1992), and *KSR International Co. v. Teleflex, Inc.*, 550 U.S. 398, 82 USPQ2d 1385 (2007). As provided above, the Examiner asserts that in the instant case, it would have been obvious to one having ordinary skill in the art to modify the invention of Eshita to explicitly indicate that the receiver unit determines a chronological position of a focal point of either the ultrasonic signal or its envelope curve as the characteristic value, as taught by Ai, because Eshita explicitly discloses determining a time of a value characteristic of the ultrasonic signal as a maximum amplitude of the ultrasonic signal (see, Eshita, Figure 2) but is silent as to the specific manner to find such a maximum amplitude and Ai suggests a corresponding means for determining such a maximum location using an accurate and simple calculation that is effective when dealing with a plurality of peaks that are difficult to distinguish (Ai; column 3, line 55 to column 4, line 38 and column 7, lines 10-24) with Appellant also admitting that “Ai teaches improving finding a peak” (Appeal Brief, page 14, line 8).

The Examiner further notes that one having ordinary skill in the art would also recognize the ability to modify Eshita with Ai to arrive at Appellant’s invention in that each of the invention of Eshita, Ai, and Appellant’s invention, all include means for determining a peak characteristic and/or a method for improving over a prior art

method of determining a peak characteristic of similar waves as illustrated by Figure 2 of Eshita, Figure 2 of Ai, and Figure 3 of Appellant's invention:



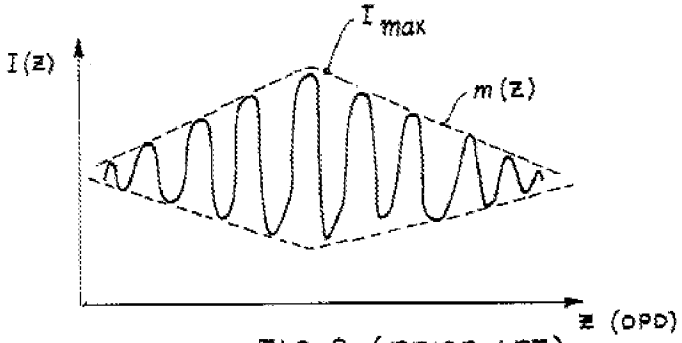


FIG. 2 (PRIOR ART)

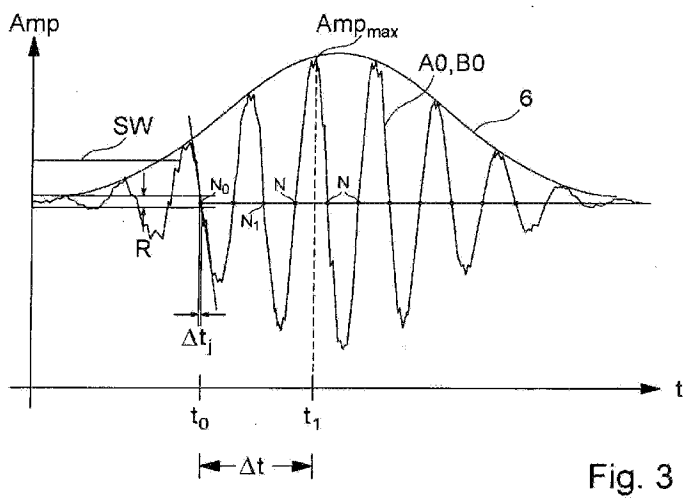


Fig. 3

Further, while Appellant argues that "Appellant claims finding a time t_1 of a characteristic value of a detected signal, calculating a time shift Δt of the time t_1 of the characteristic value of the ultrasonic signal relative to the reception time t_0, and using the time shift Δt to determine a correct time value for the reception time t_0", the Examiner maintains that the features of "finding a time t_1 of a characteristic value of a detected signal, calculating a time shift Δt of the time t_1 of the characteristic value of the ultrasonic signal relative to the reception time t_0, and using the time shift Δt to determine a correct time value for the reception time t_0" are met by the invention of Eshita as disclosed above.

- In response to the rejection of claims 1 and 4-7, as may best be understood due to the indefiniteness discussed above, under 35 U.S.C. 103(a) as being unpatentable over Applicant Admitted Prior Art in view of JP Patent Application Publication No. 2003-050145 to Eshita et al. and further in view of U.S. Patent No. 5,633,715 to Ai et al., Appellant argues:

> As stated above, Eshita does not discloses determining a time (t_1) of a characteristic value at paragraph [0026], or using a time shift (Δt) of the time (t_1) of the characteristic value relative to the reception time (t_0), as asserted by the Examiner in the last three lines of page 7 of the final Office Action. Nor does Eshita disclose determining a correct time value for the reception time (t_0), at paragraph [0032], lines 1-13, as asserted by the Examiner in the last line of page 7, through the first two lines of page 8 of the final Office Action.
>
> Also as stated above, incorporating the teachings of Ai into Eshita could not be carried out without substantially modifying Eshita because Eshita does not determine a chronological position of a focal point of either the ultrasonic signal or its envelope curve as the characteristic curve, the time of the characteristic value and time shift, and that such proposed modification would render the Eshita unsatisfactory for its intended purpose, and/or at least change Eshita's respective principles of operation.
>
> Hence, it would not have been obvious to have modified AAPA in view of Eshita, and further modifying same with the teachings of Ai.
>
> And in view of the shortcomings of Eshita, even assuming arguendo that the skilled artisan would have considered modifying AAPA by the teachings of Eshita and Ai, the proposed combination would still not realize a flow sensor that determines a time of a characteristic value of an ultrasound signal, a time shift of the time relative the reception time and uses the time shift to determine a correct time value of the reception time including determining a chronological position of a focal point of the ultrasonic signal or its envelope as the characteristic value, including the actual equation Ts, as claimed.

The Examiner asserts that these arguments have been fully addressed above with respect to the rejection of claims 1, 4, 6, and 7, as may best be understood due to the indefiniteness discussed above, under 35 U.S.C. 103(a) as being

unpatentable over JP Patent Application Publication No. 2003-050145 to Eshita et al. in view of U.S. Patent No. 5,633,715 to Ai et al.

(11) Related Proceeding(s) Appendix

No decision rendered by a court or the Board is identified by the examiner in the Related Appeals and Interferences section of this examiner's answer.

For the above reasons, it is believed that the rejections should be sustained.

Respectfully submitted,

/Jeffrey R. West/

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